

1.	Course title	Multimedia systems		
2.	Course code			
3.	Study program	Master studies of Information Science and Computer Engineering - Intelligent Information Systems		
4.	Unit offering the course	FCSE		
5.	Undergraduate/master/PhD	Master		
6.	Year/semester 1/summer/elective	7. ECTS: 6		
8.	Teacher(s)	assist. prof. dr. Ivica Dimitrovski / prof. dr. Suzana Loshkovska		
9.	Course prerequisites	None		
10.	Goals (learning outcomes): Upon the completion of the course, the student will be able to model and develop multimedia information systems and to apply the concepts of content based retrieval.			
11.	Course content: Organization of the multimedia data. Data models and data access. Transmission of multimedia information, protocols, interfaces and coding standards and formats for data exchange, synchronization and media real-time support. Representation of the audio/visual content. Global descriptors. Local descriptors. Algorithms for generating visual vocabulary. Algorithms for classification and recognition of visual objects. TF-IDF weighting. Practical examples: Content based search in multimedia systems. Scalable techniques and algorithms for efficient search and classification of images and videos.			
12.	Teaching methods: Lectures supported by slide presentations, interactive lectures, trainings (using lab equipment and software packages), team work, case studies, invited guests and lectures, individual practical assignments presentations, seminar paper, e-learning (forums, consultations).			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	130+0+50 = 180 hours		
15.	Teaching activities	15.1.	Lectures	130 hours
		15.2.	Training (labs, problem solving), seminar and team work	0 hours
16.	Other activities	16.1.	Project work	15 hours
		16.2.	Self study	15 hours
		16.3.	Home work	20 hours
17.	Grading			
	17.1.	Tests		65 points
	17.2.	Seminar work/project (written or oral presentation)		25 points
	17.3.	Active participation		10 points
18.	Grading criteria		to 59 points	5 (five) (F)
			from 60 to 68 points	6 (six) (E)
			from 69 to 76 points	7 (seven) (D)

		from 77 to 84 points	8 (eight) (C)			
		from 85 to 92 points	9 (nine) (B)			
		from 93 to 100 points	10 (ten) (A)			
19.	Final exam prerequisites	Successfully completed activities 15.1 and 15.2				
20.	Course language	Macedonian and English				
21.	Quality assurance methods	Internal evaluation and student questionnaires				
22.	Literature					
	22.1.	Compulsory				
		No.	Authors	Title	Publisher	Year
		1.	Ze-Nian Li, and Mark S. Drew	Fundamentals of Multimedia	Prentice Hall	2003
		2.	K. Selcuk Candan and Maria Luisa Sapino	Data management for multimedia retrieval	Cambridge university press	2010
	3.		ACM Multimedia Conference Proceedings			
	22.2.	Additional				
		No.	Authors	Title	Publisher	Year
		1.	J. Philbin, O. Chum, M. Isard, J. Sivic and A. Zisserman	Object retrieval with large vocabularies and fast spatial matching	CVPR	2007
		2.	J. Sivic and A. Zisserman	Video Google: A Text Retrieval Approach to Object Matching in Videos	ICCV	2003
3.	J. Deng, W. Dong, R. Socher, L.-J. Li, K. Li and L. Fei-Fei	ImageNet: A large-scale hierarchical image database	CVPR	2009		